EXHIBIT U

Polypropylene

An A-Z reference

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Table 1 Mobility regions for physical aging of polypropylene (temperature values refer to homopolymers produced with conventional catalysts)

Region	T_{min} (°C)	T_{max} (°C)	*Changes affect*
Glass	–	0–4°C (T_g, T_β)	Density, mechanics (slightly)
Amorphous mobility	0–4°C (T_g, T_β)	50–100°C (T_α)	Density, mechanics, order in amorphous phase (strongly)
Crystalline mobility	50–100°C (T_α)	145–160°C (T_r)	Density, mechanics, crystallinity in mesomorphic phase
Recrystallization	145–160°C (T_r)	162–167°C (T_m)	Melting point, crystallinity (transition $\alpha_1 \rightarrow \alpha_2$)
Melt relaxation	162–167°C (T_m)	–	Phase morphology in heterophasic systems, overall structure

T_r, recrystallization temperature.

changes in the elastomeric phase with T_g at −60 to −30°C can take place at lower temperatures to a great extent already. As indicated in Table 1, phase relaxation takes place here during actual melting.

CHEMICAL CHANGES IN THE MATERIAL

Apart from purely physical changes, aging effects involving the chemical structure of the polymer have also to be considered. In contrast to other polyolefins, such as PE or most olefin-elastomers (EPR, ethylene-propylene-diene rubber (EPDM)), radical reactions in PP cause mainly a degradation effect, reducing the average chain length of the polymer and especially affecting the high molar weight fraction. As these are of primary importance for the mechanics of the system – through their activity as inherent nucleants as well as their function as 'tie molecules' between different crystalline sections – a significant reduction of mechanical properties can also be expected. The normal consequence is embrittlement, a massive decrease in toughness.

The main possible sources of harmful radicals are:

- combination of oxygen and heat;
- ozone;
- UV radiation; and